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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,432	03/12/2004	Takuichi Arai	04853.0112	6544

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EXAMINER

KALAFUT, STEPHEN J

ART UNIT PAPER NUMBER

1745

DATE MAILED: 12/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/798,432

Applicant(s)

ARAI, TAKUICHI

Examiner

Stephen J. Kalafut

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1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,5 and 8-11 is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_ is/are rejected.
- 7) ☒ Claim(s) 2-4,6 and 7 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date ( <u>2 dates</u> ). | 6) <input type="checkbox"/> Other: ____  |

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Claims 5, 8 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "bulky functional group" in claim 5 is a relative term which renders the claim indefinite. The term "bulky" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The terms "small interaction" in claim 5 and "thin membrane" would likewise have indefinite scope, because the limits of "small" and "thin" are not defined in the present disclosure. Claim 10 depends from claim 8, and would likewise be indefinite.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Lahanas *et al.*  
(US 6,042,039).

Lahanas *et al.* disclose a clay mineral such as montmorillonite, kaolin, and smectic clay (column 2, lines 5-10), crosslinked with acid salts containing polyvalent metal ions (column 2, lines 12-17). These clays are presently described as "layered clay minerals", and would thus

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meet this present recitation, the specification being used to define this term in the claim.

Because of the above-mentioned acidity, the resulting composition would be a proton conductor.

Because the clays disclosed by Lahanas *et al.* are layered, the metal ions would be incorporated between the layers, which they would crosslink to each other.

Claims 1 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Kerres *et al.* (US 7,409,020).

Kerres *et al.* disclose layered clay phyllosilicates, in which adjacent layers are linked to each other by metal ions, including some that are polyvalent (column 6, lines 56-62). They clay is used in a composite with acidic ion conductive materials (column 8, lines 15-26), thus forming a proton conductor, and is taught as being useful as an ion conductive membrane in fuel cells (column 9, lines 47-55).

Claims 1 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Häring *et al.* (DE 199 19 881 A1).

This document is the German equivalent of Kerres *et al.* above, and thus would disclose the same metal ion crosslinked phyllosilicates and acidic ion conductive materials. Because Häring *et al.* was published in November 2000, it is available under §102(b).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Kerres *et al.* or Häring *et al.*, both above.

While these documents disclose the use of their materials as ionic conductors in a fuel cell, but do not mention the various fuel cell components. These, however, are conventional in the fuel cell art, and would be obviously used when the materials of Kerres *et al.* or Häring *et al.* are employed as the electrolyte therein. For this reason, this claim would be obvious over either Kerres *et al.* or Häring *et al.*

Claims 2-4, 6 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The references cited either herein or by applicant do not disclose a layered clay mineral that includes a cationic surfactant, or which is crosslinked with a tetrafunctional alkoxide, a trifunctional alkoxide, a bis-alkoxysilane, or an alkoxysilane having an epoxy ring.

Claim 5 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The prior art does not disclose a layered clay mineral crosslinked with a alkoxide having a "bulky" functional group.

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Claims 8 and 10 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action. This prior art does not disclose the method of making the present clay mineral, including the steps of adding water, adding a crosslinking agent, developing the resulting liquid on a substrate, heating and drying the resulting layer, and immersing the resulting membrane into a bath containing polyvalent ions.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Arai (US 2004/0081823) discloses a proton exchange membrane containing a layered clay powder and a crosslinking structure comprising a SO<sub>2</sub> group.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is 571-272-1286. The examiner can normally be reached on Mon-Fri 8:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

sjk

A handwritten signature in black ink, appearing to be 'J. K. H.' or similar, written in a cursive style.

ATTORNEY IN FIRM  
PATENT EXAMINER  
GROUP 1700